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**(19) (CA) APPLICATION FOR CANADIAN PATENT (12)**

(54) Method of and Injection Mold for Injection Molding of an Article Having a Closed Hollow Internal Space

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**Notice:** This application is as filed and may therefore contain an incomplete specification.



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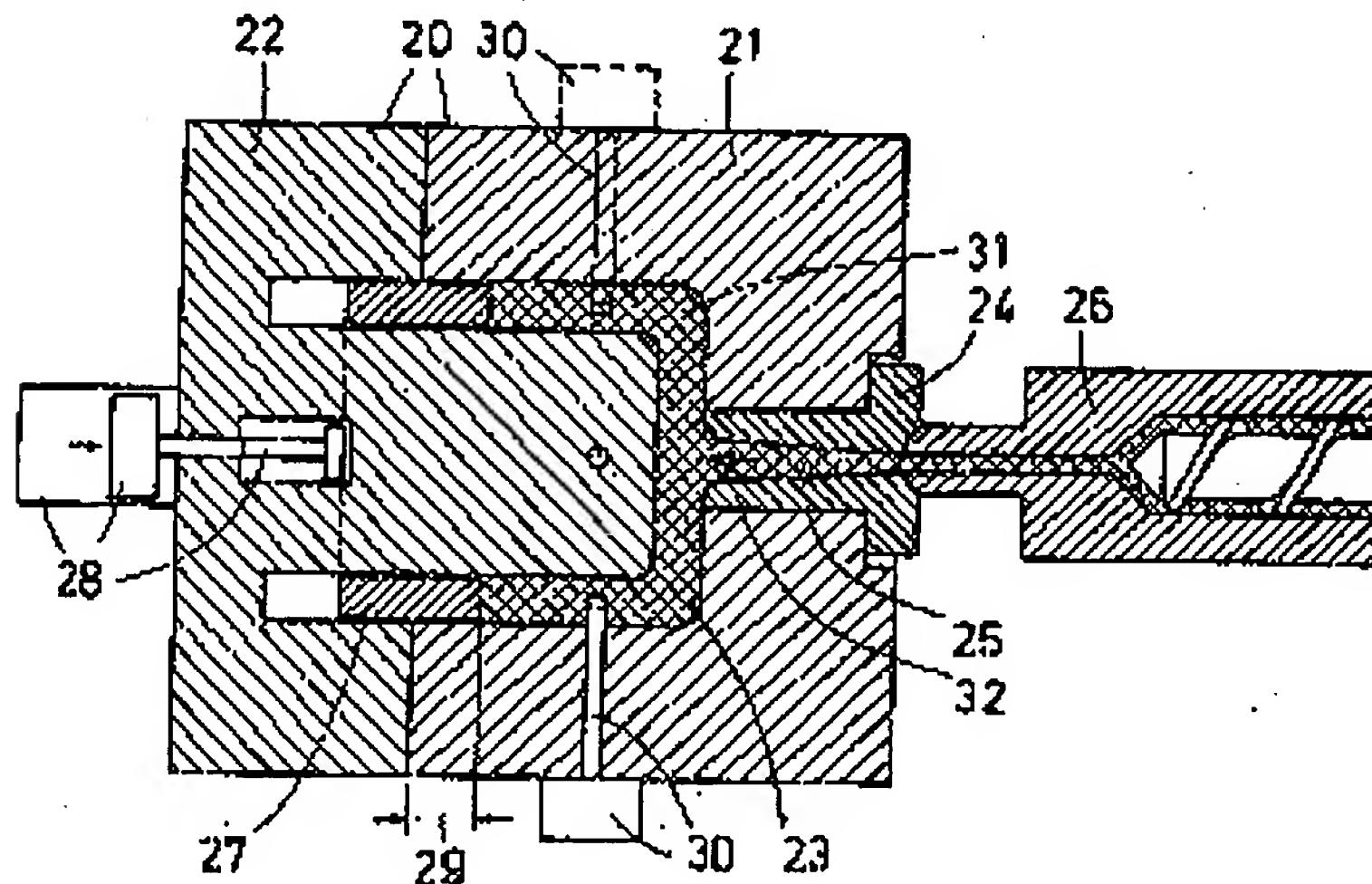
(12) Patent Application:

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(54) METHOD OF AND INJECTION MOLD FOR INJECTION MOLDING OF AN ARTICLE HAVING A CLOSED HOLLOW INTERNAL SPACE

(54) METHODE DE MOULAGE PAR INJECTION D'ARTICLES COMPORTANT UN ESPACE FERME CREUX; LE MOULE CORRESPONDANT

Representative Drawing:



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### ABSTRACT:

#### ABSTRACT OF THE DISCLOSURE

A method of injection molding of an article having a closed internal hollow space includes

injecting a plastic melt into a mold cavity of an injection mold having an initial volume, maintaining the plastic melt in the mold cavity under a dwell pressure for a predetermined period of time, thereafter, injecting a fluid pressure medium into the plastic melt in the mold cavity, and, after the injection of the fluid pressure medium was started, either increasing the initial volume of the mold cavity, if it was less than a volume of the molded article, to a volume corresponding to the article volume, or discharging a predetermined amount of the plastic melt from the mold cavity if the initial volume of the mold cavity corresponded to the volume of the molded article. An injection mold for effecting the foregoing method is also described.

CLAIMS:

1. A method of injection molding an article from a thermoplastic material, the walls of the article enclosing a hollow space, said method comprising the steps of: filling by injection a molding cavity of a mold and having a predetermined volume with a plastic melt; increasing the predetermined volume of the molding cavity; and admitting a fluid pressure medium for distributing the plastic melt along the walls of the cavity so that it abuts the walls, whereby a hollow space is formed, wherein said fluid pressure medium admitting step comprises admitting the fluid pressure medium into the predetermined mold cavity volume, filled with the plastic melt, only after expiration of a rest period following the completion of said filling by the injection step, and wherein said volume increasing step is effected only during the admission and/or dependent on the admission of the fluid pressure medium into the molding cavity.
2. A method as set forth in claim 1, further comprising the step of subjecting the plastic melt in the predetermined mold cavity volume to a dwell pressure.
3. An injection mold for injection molding of an article from a thermoplastic material, the walls of the article enclosing a hollow space, said injection mold comprising: first and second mold halves defining together a mold cavity; displaceable means having a first position in which it limits a volume of the mold cavity to a predetermined volume which is less than a volume of the injection molded article, and a second position in which a volume of the mold cavity corresponds to the volume of the injection molded article; means for injecting plastic melt into the mold cavity; means for injecting a fluid pressure medium into the plastic melt in the mold cavity; and means for displacing displaceable means from the first position thereof to the second position thereof.
4. An injection mold as set forth in claim 3, wherein the displaceable means comprises a core slide displaceable in the mold cavity in the direction parallel to a longitudinal extent of the mold cavity.
5. An injection mold as set forth in claim 3, wherein the displaceable which comprises a slide displaceable transverse to a longitudinal extent of the mold cavity.
6. An injection mold as set forth in claim 4, further comprising fluid cylinder means for displacing the core slide.
7. An injection mold as set forth in claim 5, further comprising fluid cylinder means for displacing the slide.
8. An injection mold as set forth in claim 7, further comprising spring means for biasing the

slide to the first position of the displaceable means, the displaceable means comprising a slant surface formed on the slide and contacted by the plastic melt, the slide being displaceable from the first position of the displaceable means to the second position thereof when pressure in the mold cavity exceeds a predetermined value.

9. A method of injection molding of an article having a closed internal hollow space from a thermoplastic material, said method comprising the steps of: providing an injection mold having a mold cavity and one of displaceable means having a first position in which it limits a volume of the mold cavity to a predetermined volume which is less than a volume of the injection molded article, and a second position in which a volume of the mold cavity corresponds to the volume of the injection molded article, and draining means which is used when an initial volume of the mold cavity corresponds to a volume of the injection molded article, and which has a first position, in which it blocks flow of a plastic melt from the mold cavity, and a second position, in which the plastic melt can flow from the mold cavity; injecting plastic melt into the initial volume of the mold cavity until the plastic melt fills the initial volume; thereafter, maintaining the plastic melt in the initial volume of the mold cavity for a predetermined period of time; thereafter, starting an injection of a fluid pressure medium into the plastic melt in the mold cavity; displacing the one of the displaceable means and the draining means, in response to the starting of injection of the fluid pressure medium into the plastic melt, from the first position thereof to the second position thereof whereby, due to one of increasing of a volume of the mold cavity and removal of a predetermined amount of plastic melt from the mold cavity, respectively, the plastic melt in the mold cavity is separated by the fluid pressure medium, extends along the walls of the injection mold defining the mold cavity and abuts the cavity defining walls; thereafter, aspirating the fluid pressure medium from the mold cavity so that an article with an internal hollow space is produced; and removing the finished article from the injection mold.

10. A method as set forth in claim 9, wherein said maintaining step includes subjecting the plastic melt in the initial volume of the mold cavity to a dwell pressure.

11. A method as set forth in claim 9, wherein said displacing step includes initiating of displacement of the one of the displaceable means and the draining means by one of external control means, timing means, and melt pressure.

12. An injection mold for injection molding of an article having a closed internal hollow space, said injection mold comprising: first and second mold halves defining together a mold cavity; one of displaceable means having a first position, in which it limits a volume of the mold cavity to a predetermined initial volume which is less than a volume of the injection molded article, and a second position, in which a volume of the mold cavity corresponds to the volume of the injection molded article, and draining means which is used when an initial volume of the mold cavity corresponds to the volume of the injection molded article and which has a first position, in which it blocks flow of plastic melt from the mold cavity, and a second position, in which the plastic melt can flow from the mold cavity; means for injecting plastic melt into the mold cavity; means for injecting a fluid pressure medium into the plastic melt in the mold cavity; and means for displacing the one of the displaceable means and the draining means from the first position thereof to the second position thereof.

13. An injection mold as set forth in claim 12, wherein the injection mold comprises the displacement means which comprises a core slide displaceable in the mold cavity in a direction parallel to a longitudinal extent of the mold cavity.

14. An injection mold as set forth in claim 12, wherein the injection mold comprises the displaceable means which comprises a slide displaceable transverse to a longitudinal extent of the mold cavity.
15. An injection mold as set forth in claim 13, further comprising fluid cylinder means for displacing the core slide.
16. An injection mold as set forth in claim 14, further comprising fluid cylinder means for displacing the slide.
17. An injection mold as set forth in claim 14, further comprising spring means for biasing the slide to the first position of the displaceable means, the slide comprising a slant surface contacted by the plastic melt, the slide being displaceable against a spring force of said spring means from the first position of the displaceable means to the second position thereof, when pressure in the mold cavity exceeds a predetermined value.
18. An injection mold as set forth in claim 12, further comprising an auxiliary chamber and a channel connecting the auxiliary chamber with the mold cavity, the injection mold comprising the draining means located in the connecting channel.
19. An injecting mold as set forth in claim 18, wherein the draining means comprises a displaceable member extending into the connecting channel, and a fluid cylinder means for displacing the displaceable member.
20. An injection mold as set forth in claim 18, wherein the draining means comprises a displaceable member extending into the connecting channel, and spring means for biasing the displaceable member to the first position of the draining means, the displaceable member comprising a slant surface contacted by the plastic melt, the displaceable member being displaceable from the first position of the draining means to the second position of the draining means when pressure in the mold cavity exceeds a predetermined value.

\*\*\* Note: Data on abstracts and claims is shown in the official language in which it was submitted.

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